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SOME MELIOLICOLOUS PARASITES AND COMMENSALS FROM PORTO RICO

F. L. Stevens

(WITH PLATES V AND VI AND FIVE FIGURES)

The genus *Meliola* is distinctly tropical and within the tropics is most abundant in humid locations, although there are many species found in arid regions. It is chiefly in the warm humid locations that the species are accompanied and overgrown by other fungi; frequently so heavily overgrown as to entirely obscure the *Meliola* itself, stop spore production, and even the presence of the *Meliola* may be proved only by very careful search. The exact relation which these fungi bear to the *Meliola* is not known. True parasitism, owing to the dark color of the mycelium, is much more difficult to demonstrate than in the case of *Cicinnobolus* on the Erysiphaceae, so familiar in temperate climates. It is extremely probable that all of the forms except the last considered are parasitic. This last is probably merely an accidental associate. Some of the pycnidial forms were formerly regarded as belonging to the *Meliola* cycle, but more recent studies do not support this view. Two of the hyphomycete genera have been regarded by some students of *Meliola* as the conidia of *Meliola*, while others treat them as independent fungi, and still others evade the question.

It is not possible to regard the ascigerous forms of *Microthyrium*, *Dimerium*, *Podosporium*, *Calonectria*, etc., as genetically connected with the *Meliola*, nor is there any more reason for assuming genetic connection in the case of any of the forms mentioned later. They may be merely commensals favored by the environment, but there is very strong circumstantial evidence that they are parasitic, and there is no sufficient reason to regard any of them as belonging to *Meliola*. The special statement in this connection relating to *Arthrobotryum* and *Helminthosporium* is given later. The specimens upon which this article is based are filed under the *Meliola* host, and are deposited as indicated in an article by Miss Young.[1]

[1] Young, E., Mycologia 7:143. 1915.

PEZIZACEAE

BELONIDIUM LEUCORRHODINUM (Mont.) Sacc. on *Meliola chiococcae* Stev. on *Chiococca alba*, 7325, Hormigueros; on *Meliola tortuosa* Wint. on *Piper umbellatum*, 5656, Jajome Alto; on *Meliola rudolphiae* Stev. on *Rudolphia volubilis*, 4835, Maricao, 5439, Luquillo Forest.

This fungus is very inconspicuous and would escape observation except under a good lens. It then appears as numerous small pale disks upon the *Meliola* mycelium. Although the present specimens agree well with the description given in the *Sylloge Fungorum*, there is still some doubt as to its generic position; indeed, the limits of the genera *Calloria* and *Belonidium* are of such nature that this fungus might well be placed in either of them. Although septation of the spores was not definitely proved, there is a segmentation of the protoplasm in the spores which seems to indicate beginning of septation.

PERISPORIACEAE

Perisporium paulliniae, sp. nov. (text fig. 1).—Mycelium inconspicuous. Perithecia few in centers of old *Meliola* colonies. Asci fasciculate from base of perithecium, 100×25 μ, clavate, 8-spored; spores inordinate, clavate to somewhat irregular-cylindrical, 5-septate, 44×10 μ, usually with two cells decidedly thicker than the others; these thickened cells the second and third from one end. Ends obtuse, constriction medium, color dark smoky.

FIG. 1.—*Perisporium paulliniae* on *Meliola hessii*, no. 1207 (type).

On *Meliola hessii* Stev. on *Paullinia pinnata*, 1207 (type), Mayagues.

Perisporium meliolae, sp. nov. (text fig. 2).—Mycelium scant, inconspicuous, growing upon *Meliola* mycelium. Perithecia clustered in the central regions of old *Meliola* colonies, lenticular, slightly taller than broad, 230–280 μ thick, 312 μ high, surface closely covered with short tubercles. Asci numerous, fascicled, 8-spored, cylindrical. Paraphyses absent. Spores 7–14×31–44 μ,

brown, usually 3-septate (sometimes less), often tapering toward one end, that is, ends not equally thick. Ends obtuse, median constriction greater than the others, wall thick, 2–3 μ, surrounded by a distinct, thin, gelatinous coat.

On *Meliola compositarum* var. *portoricensis* Stev.; on *Eupatorium portoricense*, 6032 (type), 6557, 6056, 6003, 6861, 6031, 6866, Dos Bocas near Utuado, 5192, San Sebastian.

The presence of the 8-spored, fascicled, long, narrow asci and the absence of the typical *Meliola* mycelium distinguish this *Perisporium* from *Meliola*. The peculiar lenticular perithecia, which stand on edge, are also characteristic. Associated with this species are conidiophores and conidia, and it is entirely probable that it may be the ascigerous stage of one of the Meliolicolous species of *Helminthosporium*.

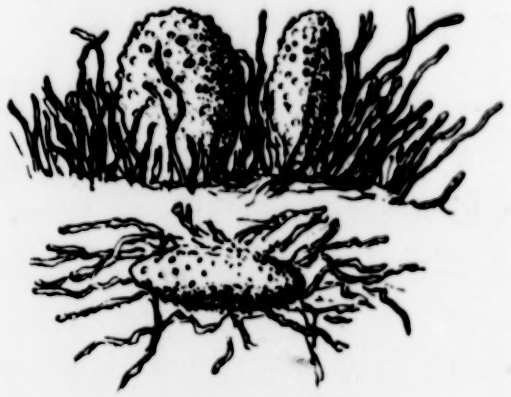

FIG. 2.—*Perisporium meliolae* on *Meliola compositarum* var. *portoricensis*. no. 6032 (type); flattened perithecium; views from side, edge, and from above; an ascus and single spore.

These two species of *Perisporium* are especially interesting, since, growing on *Meliola*, their perithecia are likely to be taken for the *Meliola* perithecia, which they closely resemble in character of spores. They are readily separable, however, from *Meliola* by the absence of the characteristic *Meliola* hyphopodia and by the presence of the fascicled, 8-spored asci which perhaps do not really occur in true *Meliola*.

DIMERIUM PICEUM (B. and C.) Thiessen Bot. Centralbl. Beih. 29:66. 1912.—*Asterina picea* B. and C.; *Dimerium microsporium* Speg.; *D. meliolicolum* Speg.; *D. guineri* R. Marie; *Dimerosporium tropicale* Speg.; *D. clidemniae* P. Henn.; *D. hyptidicola* P. Henn.; *D. dendriticum* A. and S.

On *Meliola glabra* var. *psychotriae* Stev. on *Psychotria* sp., 5032, Quebradillas; on *Palicourea* (?) 1070, Mayaguez. On *Meliola bicornis* Wint. on *Meibomia supina*, 4532, Cataño. On *Meliola glabroides* Stev. on *Piper aduncum*, 4802, Maricao. On *Meliola tortuosa* Wint. on *Piper umbellatum*, 3379, Maricao. On *Meliola ipomoeae* E. Heller's coll. no. 6285 appears to be the same, but the available material is scarce. On *Meliola compositarum* E. var.

portoricenis Stev. on *Eupatorium portoricense*, 6031, Utuado. On *Meliola pteridicola* Stev. on *Aneimia adiantifolia*, 7269, Quebradillas, 8015, Utuado, 7814, Rio Tanamá. On *Meliola panici* E. on *Panicum glutinosum*, 4801, Maricao; on Gramineae indet., 6796, Arecibo; on *Lasiacis divaricata*, 4298, Manati. On *Meliola paulliniae* Stev. on *Casearia ramiflora*, 6683, St. Ana, 5844, San German.

While slight variations occur, it seems best to do as THIESSEN has done and regard the variants as of one species, and to unite the several species which were originally described as distinct.

MICROTHYRIACEAE

Members of this family abound on *Meliola*. The manner in which the mycelium of the parasite clothes the mycelium of the *Meliola* in a sheath is particularly striking. In some instances only single *Meliola* branches, portions of a colony, are so coated; in other cases the whole *Meliola* colony is covered. Sometimes the sheathing is limited to the host mycelium, but in older specimens the sheath expands into a continuous sheet or crust. The perithecia are very numerous, on young colonies as very small developing structures, on old ones as dense clusters of mature perithecia. Several species of *Meliola* have been described as having this crustose structure, and it is very probable that all such cases represent merely parasitized colonies. Generic and specific determination of the specimens is deferred for consideration in a separate paper dealing with the family.

HYPOCHREALES

Pseudonectria pipericola, sp. nov.—Mycelium closely appressed on the *Meliola* mycelium. Perithecia numerous, minute, 100–125 μ in diameter, pink, with a few setae around the ostiole. Setae short, 20–30 μ, obtuse, continuous; asci cylindrical, 50×5–7 μ, 8-spored, 1-seriate, sometimes oblique; paraphyses none; spores elliptical or oblong, obtuse, continuous, hyaline, 9–10×3–4 μ.

On *Meliola tortuosa* Wint. on *Piper umbellatum*, 5656 (type), Jajome Alto, 3578, 3508, 3507, Añasco, 7916, 7848, Rio Tanamá; on *Piper marginatum*, 7777, 7842, Rio Tanamá.

This is closely related to *Nectria mycelophila* Pk. described on decaying fungi, but differs in having smaller spores, different shape of asci, and in the presence of setae around the ostiole.

Nectria meliolicola, sp. nov.—Amphigenous, spot none, mycelium white, closely appressed to the *Meliola* mycelium and to the leaf, usually coextensive with the *Meliola* or slightly exceeding it. Perithecia very minute, 50–60 μ at center or near edge of colony, hyaline, hairy at apex, hairs 15 μ long. Asci ovate to elliptical, obtuse, stipitate, 40–45×11–14 μ; spores 1-seriate, oblique, 1-septate, hyaline, linear, 24–28×3–4 μ, acute.

Associated with an undetermined *Fusarium* on *Meliola paulliniae* Stev. on *Casearia sylvestris*, 1051, Mayaguez (type).

It is impossible to distinguish the mycelium of this fungus from that of the *Fusarium*, and it is probable that the two are one. The spot caused on the leaf is not due to these fungi but to the *Meliola*.

Nectria portoricensis, sp. nov.—Colonies approximately circular on *Meliola*, 3–7 mm. in diameter, white, central portion bearing perithecia, outer part sterile. White mycelium covering each *Meliola* strand with a shaggy coat. Perithecia red, small, 160 μ, smooth; asci 25–36×8 μ, obovate, obtuse; spores 1-seriate, oblique, oblong, hyaline, pale to green, 1-septate, 12×3 μ, obtuse.

Distinguished from *N. pipericola* P. Henn. by absence of perithecial setae, shape and size of spores, and by habit of the sterile mycelium; from *N. bakeri* Rehm. by spore characters. On *Meliola rectangularis* Stev. on *Banisteria laurifolia*, 1001, Jayuya (type).

This fungus differs strikingly from all other Porto Rican Nectriaceous fungi in the beautifully arranged, dense, shaggy, white mycelial coating which drapes with geometrical accuracy every affected strand of the *Meliola* mycelium. A white mycelium of appearance similar to this was abundant, overgrowing colonies of *Meliola melastromacearum* Speg. no. 7037, but no perithecia were seen.

Calonectria melioloides Speg.

On *Meliola compositarum* var. *portoricensis* Stev. on *Eupatorium portoricense*, 6003, 6032, 6557, 6830, 6031, 6861, 6866, 7953, 8102, Dos Bocas below Utuado, 5192, San Sebastian; on *Eupatorium odoratum*, 6001, 6056, 6574, Utuado. On *Meliola paulliniae* Stev. on *Casearia sylvestris*, 3920, 1200, Mayaguez. On *Meliola hessii* Stev. on *Paullinia pinnata*, 1207, Mayaguez.

Spores on this host showed a pale olivaceous tint. The form on *Eupatorium portoricense* usually forms a mat of densely felted mycelium and may be a distinct species. On *Meliola monensis* Stev. on *Amyris elemifera*, 6158, Mona Island.

CALONECTRIA ERUBESCENS (Rob.) Sacc.

On *Meliola bicornis* Wint. on *Meibomia supina*, 5820, Adjuntas. On *Meliola tortuosa* Wint. on *Piper umbellatum*, 5692, Jajome Alto. On *Meliola cupaniae* Stev. on *Cupania americana*, 9318, Mayaguez.

Calonectria graminicola, sp. nov.—Mycelium growing over the *Meliola* and covering it with a white coat, usually coextensive with the *Meliola*. Perithecia few to numerous, reddish, pale when dry, globose, 200–225 μ, cells irregular, 10–18 μ in diameter. Perithecial setae rather numerous, tapering regularly to an obtuse apex, not septate, base not bulbous although swollen slightly just above attachment, 75 μ long, 15 μ wide at base. Asci numerous, 8-spored, 75×7–8 μ, cylindrical; paraphyses threadlike, abundant. Spores 3-septate when mature, hyaline to pale straw colored, straight, curved or sigmoid, acute at each end, 30–36×5 μ.

On *Meliola panici* Earle on *Lasiacis compacta*, 4663 (type), Utuado; on *Lasiasis divaricata*, 4298, Manati, 6796, Arecibo. On *Meliola andirae* E. on *Andira jamaicensis*, 5269, Manati.

This fungus resembles *C. melioloides* Speg., but may readily be distinguished by its non-septate setae and the shape of the spores.

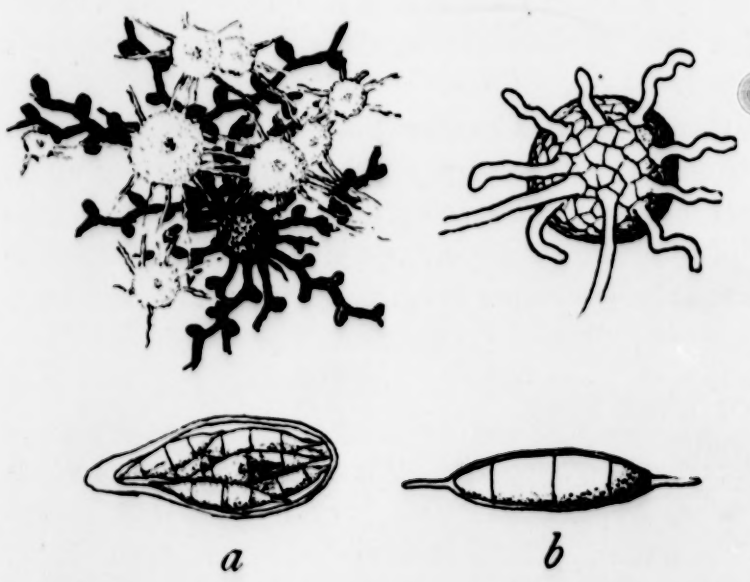

FIG. 3.—*Paranectria meliolicola*, sp. nov.: *a*, ascus, *b*, single spore.

One of the Hypochreales, probably a *Calonectria* but immature and therefore not determinable, was profuse on *Meliola toruloidea* Stev. on *Cassia quinquadrangulata*, 8394, Jajome Alto.

Paranectria meliolicola, sp. nov. (text fig. 3).—Mycelium hyaline, of threads 5 μ thick, which closely surrounded the *Meliola* mycelium. Perithecia produced in abundance, 75–120 μ in diameter, red to pale, with few setae, 15–30–50 μ long. Asci clavate to ovate, obtuse, 8-spored,

thin-walled, 45–55×25–40 μ. Spores hyaline, oblong to oblong-elliptical or with one side nearly straight and the other arched; ends obtuse, a rigid, obtuse, straight, sometimes slightly curved awn at each end. Spores 3-septate, 2 outermost septa arched strongly outward, spore body 7–10×22–30 μ; awn 2×8 μ.

On *Meliola tortuosa* Wint. on *Piper umbellatum*, 3634, Maricao (type). On *Meliola glabroides* Stev. on *Piper aduncum*, 4930, Lares.

This interesting genus differs from *Calonectria* only in the possession of appendaged spores. There are less than 10 species, none of which agrees at all closely with ours. *P. albo-lanata* Speg. described on bamboo does agree closely in spore character but not otherwise. The fungus without the use of a lens is barely visible.

Paranectria miconiae, sp. nov. (text fig. 4).—Perithecia globular, gray to white, 100–150 μ in diameter, with a whorl of basal hairs which are non-septate, thick-walled, obtuse; in length equal to

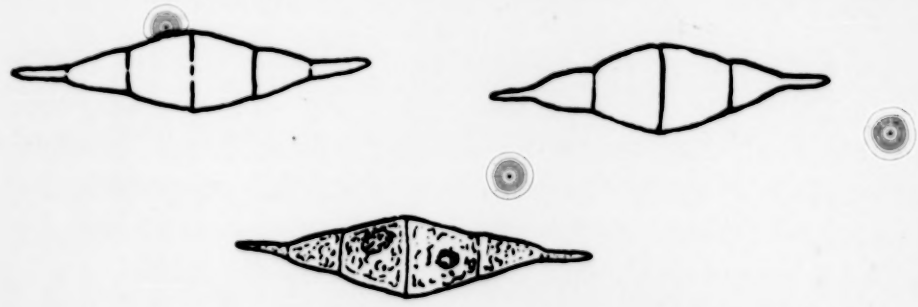

FIG. 4.—*Paranectria miconiae*, sp. nov.: *a*, habit sketch showing *Paranectria* overgrowing *Meliola; b*, perithecium seen from below, showing basal hairs; *c*, spores on microthyriaceous fungus on *Miconia;* no. 6705.

half the diameter of the perithecium. Asci numerous, clavate to ovate, obtuse, thin-walled, 60×12–15 μ. Spores fusiform, strongly thickened in middle and tapering equally to each end. Almost long diamond-shaped in outline, with a straight, cylindrical awn at each end, 32×7–8 μ including awns, 3-septate. Spores in mass, or in ascus, slightly greenish. Paraphyses threadlike, short.

On *Miconia* on Microthyriaceous fungus, 6705, Yabucoa (type).

SPHAEROPSIDALES

Naemosphaera hyptidicola, sp. nov.—Pycnidia spherical, about 60 μ in diameter, black, mycelium inconspicuous. Rostrum long, often 500 μ, 17 μ thick, dark, tip pale, composed of parallel hyphae. Spores straw colored, oblong, obtuse, 5–6×2.5–3 μ.

On *Meliola hyptidicola* Stev. on *Hyptis*, 5760, Monte de Oro (type).

This does not agree with any pycnidial forms given by GAILLARD as occurring on *Meliola;* 3 only of his are yellow spored, namely, those on *M. ganglifera*, *M. cladotricha*, and *M. furcata*. The first two have large spores, and the length of neck of the pycnidium on my species does not agree at all with any of the three. *N. hyptidicola* is also distinct from the rather closely allied genus *Cicinobella* recorded as parasitic on *Parodiella*.

Coniothyrium glabroides, sp. nov.—Pycnidia small, 50–90 μ, brown, ostiole distinct, no beak; mycelium inconspicuous; spores brown, 4–5×3.5 μ, obtuse, oblong.

On *Meliola glabroides* Stev. on *Piper aduncum*, 4802 (type). On *Meliola tortuosa* Wint. on *Piper umbellatum*, 3379, Maricao; also on no. 6258 of the Heller collection and on *Meliola compositarum* E. and no. 6185 of the Heller collection. On *Meliola guareicola* Stev. on *Guarea trichilioides*, 8166, Las Marias. On *Meliola arecibensis* Stev. on *Acalypha bisetosa*, 6547, near Utuado. On *Meliola compositarum* var. *portoricensis* Stev., 6032, on *Eupatorium portoricense*.

This fungus bears resemblance to *Cicinobella*, but the ostiole does not protrude. The spores too are different in size from the only species of that genus described. Specimens on *Meliola panici* E. on *Lasiacis divaricata*, no. 4298, Manati, agree closely with the preceding except that the spores are hyaline. I take them to be immature and place the specimens under this name. The same is true of specimen 7269, Quebradillas, on *Meliola pteridicola* Stev. on *Aneimia adiantifolia*.

In the closely allied genus *Chaetophoma* the following species have been described on *Meliola* and related genera.

C. foeda Sacc. on *Capnodium*, *C. penzigi* Sacc. on *M. penzigi*, *C. citri* Sacc. on *M. citri*, *C.*(?) *ampullula* Speg. on *M. dubia*, *C.*(?) *asterinum* Speg. on *Asterina* sp., *C. perpusilla* Speg. on *Asterina pseudopelliculosa*, *C. meliolicola* Speg. on *Dimerosporium*.

GAILLARD mentions pycnidial fungi on the following species of *Meliola: M. ganglifera*, *M. cladotricha*, *M. penicilliformis*, *M. ambigua*, *M. desmodii*, *M. furcata*, *M. dichotoma*.

MONILIALES

Acremonium meliola, sp. nov.—Mycelium copious, white to salmon colored, forming cottony blotches on leaves where it overgrows *Meliola*, fine, 3 μ, septate, hyaline. Conidiophores smiliar to the mycelium, erect or ascending, often simple or with dichoto-

mous or verticillate branching. Conidia terminal and solitary or more rarely in clusters, pear-shaped, rounded or obtuse at base, acute at apex, 15–20×5–7 μ. Spores, mycelium, and conidiophores encrusted with minute granules.

On *Meliola paulliniae* Stev. on *Paullinia pinnata*, 376, Vega Baja.

This is clearly differentiated from the other species by the shape of the spores.

Arthrobotryum Ces.

The forms here under discussion are characterized by fuscous to dark mycelium, conidiophores, and spores; conidiophores long, straight, and fascicled in typical coremia. The coremia are in the main straight and rigid, the component fibers running approximately parallel and are firmly agglutinated. They are not sporiferous upon the lower parts, but possess a well marked, long, nonsporing stipe. The extreme distal parts of the coremia are usually swollen to more or less cylindrical or conical heads, although in some species the head is but poorly developed. The spores are elliptical or falcate, 2 or 3-septate, fuscous. Such structure clearly places these forms in the Stilbaceae-Phaeostilbeae-Phragmosporae. They are usually regarded as belonging to the genus *Podosporium*, and 3 species growing on *Meliola* have been described: *P. penicillium* Speg. (Fung. Arg. Pug. IV. n. 117), *P. penicillioides* Karsten and Roum. (Rev. Myc. **12**:77. 1890), *P. densum* Pat. (Jour. de Botanique **11**:373. 1897). Examinations of original figures of the type species of this genus (*P. rigidum* Schw. Syn. Amer. Bor, n. 2608, Trans. Am. Phil. Soc. n.s. 4) and of a specimen of ELLIS (N.A.F. no. 416), which agrees with description and type figure fully, shows the *Podosporium* coremium to be pleurogenous and without heads, and therefore to be clearly distinct generically from the forms under discussion.

Comparison with figures of the type species of *Arthrobotryum* Ces., *A. stilboideum* (Engler and Prantl, Die Nat. Pflanzenfam. **1**: pt. 1. *fig. 257D*), and with figures of later species placed in this genus (Jour. Linn. Soc. **35**:13. *pl. 1. figs. 13–15.* 1901) show complete generic agreement.

While these structures have been regarded by some as independent species of fungi growing as parasites upon *Meliola*, GAILLARD

and others who have followed him regarded them as belonging to *Meliola* and constituting one of its conidial forms. The question is very complex and difficult and reminds one of the old lichen arguments.

The undisputed facts are as follows: *Meliola* possesses a relatively coarse mycelium characterized by capitate and mucronate hyphopodia. This mycelium bears perithecia, sometimes setae. Occasional species sometimes have this coarse mycelium densely entwined with a very fine mycelium entirely without hyphopodia, more pale in color, and different in every way from the first. This fine mycelium gives rise to conidiophores, simple or coremioid. To all appearances two distinct fungi are present, as was assumed by the earlier authors. The ascospores on germination nearly always immediately give rise to the typical coarse mycelium. The conidia always give rise to the fine mycelium. GAILLARD (Le Genre *Meliola*, 1892, *pl. 3. fig. 2*), however, figures, and I have several times seen, ascospores which have germinated by a somewhat finer mycelium than usual, one devoid, so far as observed, of hyphopodia. He reasons from this that the two types of mycelium are from the same parentage, the ascospore, and that therefore the conidia belong to *Meliola*. This variation from the normal mode of germination is really all the evidence that he had for this conclusion.

I believe that this evidence fails completely for two reasons. First, the fine mycelium which GAILLARD figures originating from the ascospores and which I have studied closely is not at all like the conidiiferous mycelium; it is distinctly coarser, darker (facts which come out clearly in GAILLARD's own pictures; compare his *pl. 3, figs. 3a* and *2a* with *pl. 4, figs. 3* and *1d*), and moreover there is no evidence whatever that it does produce conidia. I regard it merely as a weak *Meliola* mycelium. Second, I find this abnormal, unusual type of germination on species of *Meliola* which show no conidia; notably on *M. andirae* (cotype slide) and *M. rudolphiae* (specimen no. 8698). These facts, together with a study of more than 700 collections, and extensive field and laboratory observations of *Meliola* embracing many of these conidial stages, convince me that the fine and the coarse mycelia are from distinct and independent fungi; that the conidia do not belong to *Meliola* but to a

fungus parasitic upon it; and, as just stated, that the stilboid conidial forms belong to the genus *Arthrobotryum*. That this conclusion has also been reached by SYDOW[2] is indicated by his description of *A. caudatum* on *Meliola* in 1909. The type specimen of *A. caudatum*, loaned to me by SYDOW, clearly is cogeneric with the various forms on *Meliola* which have heretofore been called *Podosporium*. I present the following synopsis of the Porto Rican forms of this genus:

KEY TO PORTO RICAN SPECIES OF *Arthrobotryum*

Coremia incasing the *Meliola* setae ..... *A. dieffenbachiae*
Coremia not incasing the *Meliola* setae
  Vegetative mycelium closely sheathing the *Meliola* mycelium .. *A. glabroides*
  Vegetative mycelium not closely sheathing the *Meliola* mycelium
    Conidia long, elliptical, with no distinct beak cell ..... *A. penicillium*
    Conidia with distinct beak cell, basal cell, and two central cells *A. caudatum*

Arthrobotryum dieffenbachiae, sp. nov. (fig. 4).—Mycelium inconspicuous, scant, fine, pale, tufted around the bases of the coremia. Coremia often growing incasing the setae of the host, yellow, stalks 17–31 μ thick; total length 470–630 μ; apical portion either broadened into a fan-shaped brush or very narrow with lateral conidia; sporiferous part about 150 μ long. Conidia 3-septate, pale straw colored, pointed at each end, apical cell longer than basal cell, 35–38 × 3–4 μ.

On *Meliola dieffenbachiae* Stev. on *Dieffenbachia sequina*, no. 8077 (type), Dos Bocas below Utuado.

This species is the only one recorded which utilizes the setae of its host as supports for the coremia. The young coremia are somewhat transparent, and in them the supporting setae with their characteristically branched apices may be seen incased.

Arthrobotryum glabroides, sp. nov. (figs. 1–3).—Mycelium forming a loose network on the leaf surface but a close sheath over the *Meliola* mycelium, so dense as to partially obscure the hypophodia, very fine, about 1 to 1.5 μ. Coremia straight, rigid, black, stalk about 24 μ thick, head 85 μ wide and 85 μ long, top-shaped. Total length of coremia 550 μ. Conidia narrowly elliptical, acute

[2] SYDOW in DE WIDEMAN'S, EMILE DE, Fl. Bas et Moy., Congo pl. III, fasc. 1, 1909.

at each end, dark brown when mature, 17–21×3.5 μ, typically 3-septate with the two terminal cells much smaller than the other cells.

On *Meliola glabroides* Stev. on *Nectandra patens*, no. 7595 (type), Mayaguez, 8867, Maricao.

This species is quite distinct from all others seen in the characteristic manner of sheathing its host, also in the shape of the conidia.

Arthrobotryum penicillium (Speg.), comb. nov.—*Podosporium penicillium* Speg. Fung. Puigg., n. 471.

On *Meliola panici* E. on *Panicum glutinosum*, 5672, 5746, 5560, Monte de Oro, 4375, Ponce, 5947, El Gigante, 4801, 8934, Maricao, 4368, El Alto de la Bandera, 4389, Utuado; on *Lasiacis divaricata*, 4298, Manati, 6810, Arecibo; on *Ichnanthus pallens*, 7441, Mayaguez, 5755, Monte de Oro; on Gramineae indet., 6796 Arecibo.

This form was originally described by SPEGAZZINI as the conidial stage of *Meliola penicillata*, and was later regarded by GAILLARD as the conidial stage of *M. calva*.

ARTHROBOTRYUM CAUDATUM Syd. (figs. 5–7).—A portion of the type specimen was sent to me by SYDOW, and its agreement with the specimens mentioned below is obvious.

On *Meliola pteridicola* Stev. on *Anemia adiantifolia*, 8015, near Utuado. On *Meliola paulliniae* Stev. on *Casearia ramiflora*, 512, 7745, Vega Baja, 9306, Barcelonata. On *Meliola didymopanicis* P. Henn. on *Dendropanax laurifolium*, 8265, El Alto de la Bandera. On *Meliola glabra* B. and C. var. *psychotriae* Stev. on *Palicourea*, 6650, near Utuado, 468, Vega Baja; on *Psychotria pubescens*, 8032, near Utuado, 7741, 7732, Vega Baja; on *Psychotria bertiana*, 8646, 8566, 8528, El Gigante, 8278, 8673, El Alto de la Bandera; on *Palicourea*, 1070b, 316, Mayaguez; on *Psychotria* sp., 5032, Vega Baja, 5944.

What appears to be the same fungus was described as the conidial stage of *M. penicilliformis* by GAILLARD (Le Genre *Meliola*, 57, 1892). The species of *Meliola* itself being largely determined by its "conidial stage," its validity may well be doubted.

The specimens following seem to agree with the preceding in all respects except that the coremia are usually pale at tip, apparently soft, with the base tan or darker, the head merely a somewhat thickened apical region and the conidia very pale. It seems that the fungus on *Palicourea* shows transition forms which connect the two types.

On *Meliola hyptidicola* Stev. on *Hyptis lantanifolia*, 8130, Las Marias; on *Hyptis* sp., 5760, Monte de Oro. On *Meliola longipoda* Gaill. on *Anona montana*, 7561, Mayaguez. On *Meliola glabroides* Stev. on *Piper aduncum*,

9334, Martin Peña. On *Meliola ambigua* Pat. and Gaill. on *Lantana*, 6870, near Utuado.

The species on *M. glabroides* shows some variation in that the coremia usually taper gradually from the base to tip and are mounted upon a small tuft of radiating, fine, mycelial threads.

What appears to be the same species, although sterile, is on *Meliola psychotriae* E. on *Gonzalugunia spicata*, 9134, Miradero, 7592, Mayaguez, and on *Meliola melastomacearum* Speg. on *Miconia leavigata*, 8085, near Utuado, and on *Miconia racemosa*, 7636, 7414, Mayaguez. On *Meliola bicornis* Wint. on *Meibomia supina*, 8975, 8793, Maricao.

In addition to these the genus *Arthrobotryum*, under the name of *Podosporium*, has been noted as *P. densum* on *Meliola* sp. indet., as *P. penicillioides* on *Meliola tonkinensis;* while upon the following species of *Meliola* it has been described as a conidial stage: *M. echinata*, *M. insignis*, *M. glabra*, *M. quercina*.

Helminthosporium Link

Closely allied to *Arthrobotryum* is the genus *Helminthosporium*, which indeed, so far as it is parasitic upon *Meliola*, may be regarded as a simple form of *Arthrobotryum;* that is, in *Arthrobotryum* the conidiophores are fascicled in coremia, while in *Helminthosporium* the conidiophores are not so fascicled. In spore forms, in mycelial characters, and in all respects except the fasciculation of the conidiophores, the two genera as they occur on *Meliola* are identical. They bear the same relation to each other as do the form genera *Coremium* and *Penicillium*, a relation which emphasizes strongly the artificiality of a taxonomic system which separates widely forms which are in reality very closely related. The assumed genetic connection of *Helminthosporium* with *Meliola* has been sufficiently discussed under *Arthrobotryum*. The facts stated in that connection may be considered as applying equally to the forms now under discussion.

The Meliolicolous species of *Helminthosporium* are typical representatives of the genus. The mycelium is very fine, sometimes scant and diffuse, more often dense and matted. The conidiophores are commonly solitary, usually although not always much darker than the mycelium, and always considerably thicker than the mycelium. Their origin from the mycelium is well shown in

pl. 7, fig. 1 of GAILLARD'S *Le Genre Meliola*. They are in a few forms somewhat tufted, and what are apparently transition forms to *Arthrobotryum* occur. The conidia are in most species truncate at one end, beaked at the other. The beaked end is apical and the truncated end is basal, although the reverse condition might be assumed were the spores not studied *in situ* (see fig. 10); in the 3-septate forms the terminal cells are usually more pale than the central cells. The following key will serve to separate the Porto Rican species:

Conidia often more than 3-septate
- Conidiophores not very toruloid at tip ..... *H. glabroides*
- Conidiophores very toruloid at tip ..... *H. guareicolum*

Conidia not often more than 3-septate
- Conidiophores pale, translucent ..... *H. ocoteae*
- Conidiophores not pale and translucent
  - Conidia usually not strongly differentiated at two ends
    - Conidiophores 280 μ ..... *H. melastomacearum*
    - Conidiophores 170 μ ..... *H. panici*
  - Conidia differentiated strongly at two ends
    - Beak short, usually 7 μ ..... *H. parathesicolum*
    - Beak longer, usually 7 μ or more
      - Conidiophores thick, 7 μ ..... *H. helleri*
      - Conidiophores thin, 4 μ ..... *H. philodendri*

Helminthosporium glabroides, sp. nov. (figs. 8–10).—Mycelium very fine, pale, almost hyaline, conidiophores solitary, but often close together, about 100–140×7 μ, dark, sometimes pale at apex, often bent but not toruloid. Conidia 3–6-septate, 40–81×6–7 μ, truncate at base, tapering at apex.

On *Meliola glabroides* Stev. on *Piper aduncum*, 9039, El Alto de la Bandera (type), 4390, Lares, 3582, Añasco, 3647, Maricao, 4802, 3371, 7297, Arecibo, 8471, Aibonito, 9603, Las Marias. The long conidia on this host are quite typical, with a truncate base and gradually tapering toward the apical end. Occasionally smaller, 3-septate spores are seen. These are shorter, proportionately thicker, and have a long apical cell. The variation from the long, many-celled spore to the shorter 3-celled one is sometimes striking. In one part of the microscope field one form may predominate, while in another part of this field the other spore form is dominant.

On *Meliola comocladiae* Stev. on *Comocladia glabra*, 7484, 7056, Mayaguez, 760, Maricao. The conidiophores are darker than in the type and are sometimes slightly toruloid. Occasionally there is a strong tendency for them to be in groups.

On *Meliola hessii* Stev. on *Paullinia pinnata*, 1207b, Mayaguez. On *Meliola didymopanicis* P. Henn. on *Dendropanax arboreum*, 7440. On *Meliola polytricha* K. and C. no. 1256 (type specimen loaned from the Kew collection). No "conidial stage" was described for this by GAILLARD, although the type specimen contains abundant conidia, and these are mentioned by the authors of the species.

On *Meliola laguncularíae* E. on *Conocarpus erecta* L., 9201, Guanajibo. On *Meliola longipoda* Gaill. on *Tournefortia hirsutissima*, 7965, near Utuado. On *Meliola gesneriae* Stev. on *Cestrum laurifolium*, 824, Maricao. On *Meliola maricaensis* Stev. on *Ilex nitida*, 3679, 3607, Maricao. On *Meliola compositarum* var. *portoricensis*. Stev. on *Eupatorium portoricense*, 7320, Arecibo-Lares Road, 7723, Vega Baja, 6031, 6032, near Utuado; on *Eupatorium odoratum*, 6056, near Utuado. On *Meliola psychotriae* E. on *Chiococca alba*, 9299, Martin Peña, 7859, Rio Tanamá, 7467, Mayaguez. Conidia on this host are somewhat shorter than in the type. The conidiophores on no. 9299, and other specimens are sometimes quite strongly tufted, but they often grow singly as well.

On *Meliola puiggiarii* Speg. on Rubus, 8650, El Alto de la Bandera. On *Meliola gaillardiana* Stev. on *Piper aduncum*, 8225, Las Marias, 7796, Rio Arecibo. On *Meliola pteridicola* Stev. on *Aneimia adiantifolia*, 7814, Rio Tanamá, 7269, Quebradillas; on *Adiantum latifolium*, 8182, Las Marias, 7418, Mayaguez. On *Meliola toruloidea* Stev. on *Cassia quinquadrangulata*, 8394, Jajome Alto. On *Meliola monensis* Stev. on *Amyris elemifera*, 6150, Mona Island. On *Meliola nigra* Stev. on *Laguncularia racemosa*, 7197, Guanajibo.

This species is clearly differentiated from all other Porto Rican forms, and from all forms previously described associated with *Meliola*, by the long, narrow, many-septate conidia.

Helminthosporium guareicolum, sp. nov. (fig. 16).—Mycelium abundant, fine, pale. Conidiophores many, dark, basal part rigid, straight, upper part very torulose often for considerable distance (70 μ or more). Conidia truncate at base, beaked at apex, 3 or more septate.

On *M. guareicola* Stev. on *Guarea trichilioides*, 8166, Las Marias (type) 8096, Utuado.

Helminthosporium ocoteae, sp. nov.—Mycelium fine, pale straw color, diffuse. Conidiophores pale straw color, translucent, septate, tips crooked, 135–200×4 μ. Conidia 3-septate, 20–28×4–6 μ.

On *Meliola ocoteae* Stev. on *Ocotea leucoxylon*, 8428, Jajome Alto (type).

The distinguishing character of this species is in the pale, translucent conidiophores.

Helminthosporium melastomacearum, sp. nov. (fig. 11).—Mycelium very fine, 1–1.5 μ, reticulated. Conidiophores abundant, black, lax, long, thin, 280×3 μ. Conidia narrowly elliptical, 3-septate, acute at each end, 14–21×3.5–6 μ.

On *Meliola melastomacearum* Speg. on *Miconia racemosa*, 7389, Mayaguez (type). On *Meliola glabra* var. *psychotriae* Stev. on *Psychotria grandis*, 7487, Mayaguez. On *Meliola paulliniae* Stev. on *Casearia arborea*, 5709, Monte de Oro; on *Casearia sylvestris*, 1051, Mayaguez, 7285, Arecibo-Lares Road.

Helminthosporium panici, sp. nov.—Mycelium fine, pale, in loose network. Conidiophores 170×4 μ, dark, pale at tip. Conidia 3-septate, terminal cells usually pale, central cells darker, basal cell truncate, apical cell constituting a short beak.

On *Meliola panici* E. on *Olyra latifolia*, 9159 (type), 7390, Mayaguez. On *Meliola rectangularis* Stev. on *Coccoloba laurifolia*, 7292, Arecibo-Lares Road.

Helminthosporium parathesicolum, sp. nov. (fig. 12).—Mycelium copious, fine, 1.5 μ. Conidiophores solitary, pale, 120×4 μ. Conidia 1–3-septate, 17–20×4–6 μ, base truncate, apex beaked, beak often 7 μ long.

On *Meliola parathesicola* Stev. on *Parathesis serrulata*, 8192, Las Marias (type), 7286, Arecibo-Lares Road. On *Meliola bicornis* Wint. on *Dalbergia monetaria*, Arecibo-Lares Road, 7243. On *Meliola rectangularis* Stev. on *Banisteria laurifolia*, 4392, 4384, Utuado, 7358, Hormigueros, 7564, Mayaguez.

This species is similar to *H. panici*, but is distinguished from it by the beaked conidia. It appears to be identical with the structures described as conidia of *M. bicornis* by GAILLARD, although the conidia here are somewhat smaller.

Helminthosporium philodendri, sp. nov. (fig. 13).—Mycelium fine, pale. Conidiophores abundant, long, slender, 400×3–4 μ, torulose at tip. Conidia 3-septate when mature, clavate, distinctly beaked, 24–35×5–8 μ.

On *Meliola philodendri* Stev. on *Philodendrum krebsii*, 4346, Ponce.

Helminthosporium helleri, sp. nov. (figs. 14, 15).—Mycelium fine. Conidiophores solitary, black, 230×7 μ. Conidia 3-septate when mature, clavate, 24–35×5–9 μ, well differentiated basal and apical cells.

On *Meliola helleri* E. on *Myrcia deflexa*, 8268 (type), 8296, El Alto de la Bandera; on *Eugenia stahlii*, 5343, Luquillo Forest, 8436, Jajome Alto. On

Meliola gaillardiana Stev. on *Piper aduncum*, 7794, Rio Arecibo. On *Meliola glabroides* Stev. on *Nectandra patens*, 8874, Maricao. On *Meliola thouiniae* on *Winterana canella*, 8548, 9075, Guayanilla. On *Meliola gymnanthicola* Stev. on *Gymnanthes lucida*, 8596, Guayanilla. On *Meliola toruloidea* Stev. on *Cassia quinquadrangulata*, 4015, Aibonito; on *Spondias mombin*, 749, Maricao. The short, plump, 3-septate conidia are often the most numerous types on this host. On *Meliola paulliniae* Stev. on *Paullinia pinnata*, 576, Vega Baja. On *Meliola myrsinacearum* Stev. on *Ardisia guadalupensis*, 7576, 7057, Mayaguez, 3681, 8905, Maricao. The form described as conidia of *M. pulveracea* perhaps belongs here. On *Meliola guignardi* Gaill. on *Turpinia panniculata*, 3635, Maricao. On *Meliola dipholidis* Stev. on *Dipholis salicifolia*, 8549, Guayanilla. On *Meliola monensis* Stev. on *Amyris elemifera*, 6150, Mona Island. On *Meliola furcata* Lev. on *Thrinax ponceana*, 8590, 8017, Guayanilla. This last number often shows large variation in size of spores, some being very small. On *Meliola guareae* Speg. on *Guarea trichilioides*, 7464, Mayaguez. I would place here also the forms described as conidia of *M. palmicola* Gaillard, also perhaps those of *M. patouillardi*.

Species indeterminate.—On *Meliola mayaguesiana* Stev. on *Palicourea crocea*, 7196, Lajas. Mycelium very scant, conidiophores few and scattered. Conidia not seen.

In addition to the species mentioned, other species which have been recorded on *Meliola* are *H. podosporiopsis* Pat. and *H. argentinum* Speg., both of which are 4-septate; the first on unknown host, the latter on *M. argentina* and *M. uvariae*.

Species of *Helminthosporium* which do not agree with any yet mentioned have been described as conidial stages of the following: *M. manosensis*, *M. martiniana*, *M. evodiae*, *M. hyalospora*, *M. quercinopsis*.

Sterile mycelium, probably that of *Helminthosporium*, has been recorded on *M. tomentosa*, *M. lanosa*, *M. clandestina*, *M. zig-zag*.

The "conidial stages" on *M. substenospora*, *M. quericina*, *M. anomala*, *M. butleri*, *M. pulveracea*, *M. iquitosensis*, *M. psidii*, *M. monilispora*, have been so briefly described that they are not recognizable.

On the following species of *Meliola* the species of *Helminthosporium* are perhaps distinct from those already mentioned: *M. wrightii*, *M. cryptocarpa*, *M. mitchellae*.

Isthmospora, gen. nov.—Mycelium and conidiophores dark. Conidia consisting of two approximately equal halves connected by a narrow isthmus, dark. The type of the genus is *I. spinosa.*

The species here characterized are of very unique form. They clearly belong to the Fungi Imperfecti, Dematiaceae, and in this family can only find kinship in that heterogeneous group the Staurosporae, among which, however, there is no genus closely related to the present forms. They differ from *Desmidiospora,* which has two conidial forms and a hyaline mycelium, in the absence of both of these characters. There is some resemblance to *Spegazzinia* and *Tetracoccosporium*, which have been placed in the Tubercul ariaceae. The difference in spore structure, however, is sufficient to separate the genus *Isthmospora* from both of these.

Isthmospora spinosa, sp. nov. (fig. 17).—Mycelium fine, 1–2 μ, pale brown, aggregated into dense knots enveloping parts of the host mycelium. Conidiophores short, but slightly differentiated from the mycelium. The spores viewed from above are seen to consist of 4 major cells which are dark colored and rather thickly set with spines, each spine about 1 μ long. The major cells are arranged in two pairs which are connected by a 2-celled isthmus. This isthmus is flanked on either side by a circular, hyaline cell. Dimensions: total length 17–24 μ, breadth 14–20 μ, isthmus 3–4 μ wide, hyaline cell 3–4 μ in diameter.

On *Meliola psidii* Fr. on *Psidium guajava*, 3120 (type), Yauco, 5642a, Jajome Alto. On *Meliola chiococcae* Stev. on *Chiococca alba*, 7743, Vega Baja. On *Meliola byrsonimae* Stev. on *Byrsonima lucida*, 3541, Guayanilla. On *Meliola smilacis* Stev. on *Smilax coriaceae*, 5261, Manati. On *Meliola helleri* E. on *Myrcia splendens*, 5646, Jajome Alto. On *Meliola praetervisa* Gaill. on *Coccolobis sintenisii*, 7066, Mayaguez, and on *Coccolobis pyrifolia*, 7065, Mayaguez. On *Meliola philodendri* Stev. on *Philodendron krebsii*, 7225, Arecibo-Lares Road, 8994, Maricao, 4346, Ponce, 8712, El Alto de la Bandera.

Isthmospora glabra, sp. nov. (fig. 18).—Mycelium fine, 1–2 μ, pale, aggregated into knots on the host mycelium. Conidiophores short, slightly different from the mycelium. Spores of 4 major cells in 2 pairs connected by an isthmus; isthmus dark, major cells pale straw to wine colored, glabrous; total dimensions 9×10 μ.

On *Meliola melastomacearum* Speg. on *Clidemia hirta*, 9479, near Utuado. On *Meliola psychotriae* E. on *Gonzalagunia spicata*, 7793, Rio Arecibo, 7044, 7046, Mayaguez. On *Meliola bicornis* Wint. on *Meibomia supina*, 8975, Maricao. On *Meliola glabroides* Stev. on *Nectandra patens*, 8973, Maricao, and on

Simaruba tulae, 7588, Mayaguez. On *Meliola glabra* B. and C. (Rabenhorst. Fungi Europaei, no. 3849).

This species is clearly separated from the last by its small, irregular, pale spores, but most strikingly by the absence of spines which are so conspicuous on *I. spinosa*.

While the species have been seen only upon the recorded hosts, they may well occur upon others, since when sparsely present they are easily overlooked.

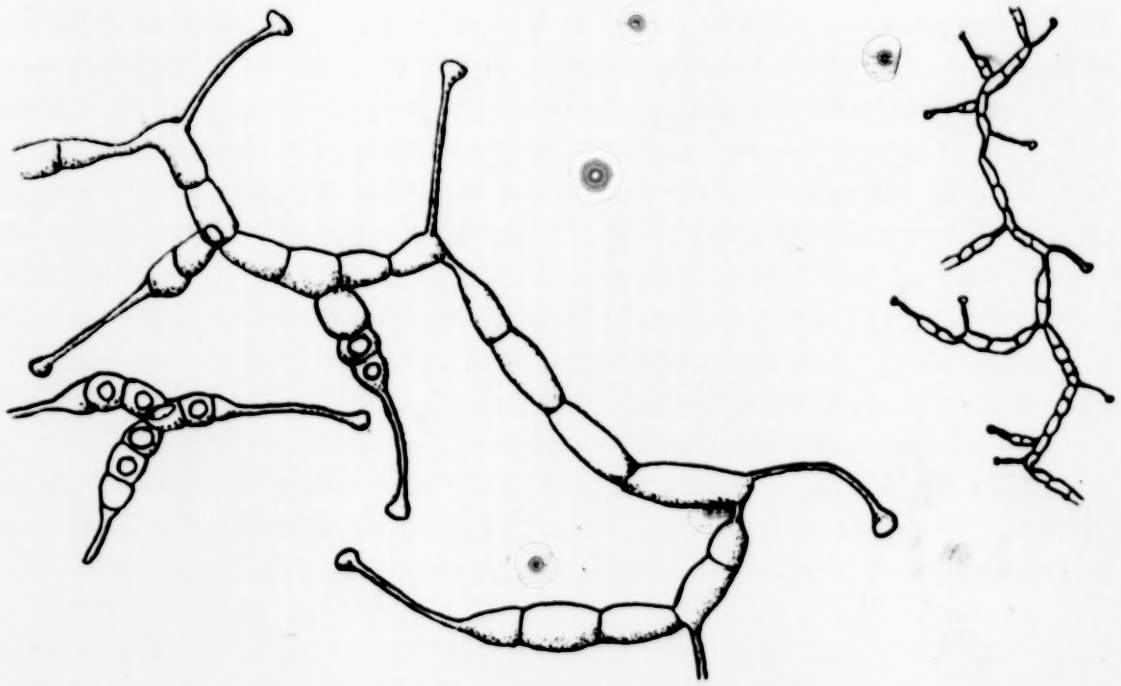

FIG. 5.—*Grallomyces portoricensis*, showing general habit of branching of mycelium and structure of supporting organs; on *Clusia minor*, no. 8283 (type) *l.p.* and *h.p.*

Fusarium meliolicolum, sp. nov.—Mycelium indistinguishable from that of *Nectria meliolicola*. Conidiophores short, cespitose in small sporodochia, 50–60 μ in diameter or by coalesence larger. Conidia clavate, curved, apex obtuse, base attenuate, 16–19 × 2.5 μ, 1–3-septate. Associated with and probably the conidial form of *Nectria meliolicola*.

On *Meliola paulliniae* on *Casearia sylvestris*, 1051, Mayaguez (type).

Grallomyces, gen. nov.—Mycelium raised from the surface by supports (*grallae*, stilts).

Grallomyces portoricensis, sp. nov. (text fig. 5).—Mycelium composed of segments arranged in zigzag fashion, strongly

constricted between segments. Supports to mycelium 17–27 μ long, with disk-formed attachments at base.

On *Clusia minor*, 8283 (type), El Alto de la Bandera; on *Guarea trichilioides*, 8166, Las Marias; on *Casearia* sp., 7074, Mayaguez; on *Mammea americana*, 8207, Las Marias; on *Palicourea crocea*, 7196, Lajas; on *Scleria* spp., 5252, Manati; on *Eugenia stahlii*, 5343, Luquillo Forest; on *Nectandra patens*, 7081, Mayaguez; on (?), 4521; on *Myrcia* sp., 818, Maricao.

The mycelium is dark brown, with some cells pale brown to straw color. It may be described as consisting of links composed of usually 4 or 5 cells each. There is some constriction at the septa between cells. The links are arranged at angles, giving the whole mycelium a zigzag or "rail fence" appearance. Each end of each link is constricted to a short (3–7 μ), narrow (2–3 μ) isthmus which forms connection with the next link. This structure is in itself remarkable enough, but more remarkable is the fact that the whole mycelium is supported free from its underlying medium by a series of "stilts" which are about 17–27 μ long. These stilts are quite uniformly distributed, one at each constriction of the mycelium, and they appear to be a projection of the constricted portion, while the next link appears as a side growth from it. The stilts are terminated by a circular enlargement which is evidently a holdfast organ. No spores or conidiophores were seen.

This fungus is often associated with *Meliola* of various species, but seems to have no connection with them. It appears to have no definite hosts, but to grow on any leaf where suitable atmospheric conditions obtain.

The following fungi not already mentioned have also been reported upon *Meliola: Dimerosporium apertum, Dimerium guinier, Hyaloderma piliferum, H. subastomum, H. tricholomum, H. lateritium, Zukalia vagans, Pseudomeliola* (?) *collapsa, Melanopsamma parasitica, Acerbiella violacea, Nectria aureola, N. bakeri, Calonectria inconspicua, C. lagerheimiana, C. erysiphoides, Paranectria wildemaniana, Lochnospermella tetraspora, Monosporium meliolicola, Mycogone meliolarum, Helminthosporium podosporiopsis, Arthrosporium parasiticum, Isariopsis penicillata, Podosporium densum, P. penicillioides, P. penicillium. Spegazzinia meliolicola, S. meliolae, S. coffeae.*

ALPHABETICAL LIST OF MELIOLAS AND THE FUNGI FOUND UPON THEM

M. ambigua.—Arthrobotryum caudatum.
M. andirae.—Calonectria graminicola.
M. arecibensis.—Coniothyrium glabroides.

M. bicornis.—Dimerium piceum, Microthyriaceae indet., Calonectria melioloides, Arthrobotryum caudatum, Helminthosporium parathesicolum, Isthmospora glabra.
M. byrsonimae.—Isthmospora spinosa.
M. chiococcae.—Belonidium leucorrhodinum, Isthmospora spinosa.
M. comocladiae.—Helminthosporium glabroides.
M. compositarum.—Coniothyrium glabroides.
M. compositarum var. portoricensis.—Perisporium meliolae, Dimerium piceum, Calonectria melioloides, Coniothyrium glabroides, Helminthosporium glabroides.
M. cupaniae.—Calonectria melioloides.
M. didymopanicis.—Arthrobotryum caudatum, Helminthosporium glabroides.
M. dieffenbachiae.—Arthrobotryum dieffenbachiae.
M. dipholidis.—Helminthosporium helleri.
M. furcata.—Helminthosporium helleri.
M. gaillardiana.—Microthyriaceae indet., Helminthosporium glabroides, H. helleri.
M. gesneriae.—Helminthosporium glabroides.
M. glabra.—Isthmospora glabra.
M. glabra var. psychotriae.—Dimerium piceum, Microthyriaceae indet., Arthrobotryum caudatum, Helminthosporium melastomacearum.
M. glabroides.—Dimerium piceum, Microthyriaceae indet., Paranectria meliolicola, Coniothyrium glabroides, Arthrobotyrum glabroides, A. caudatum, Helminthosporium glabroides, H. helleri, Isthmospora glabra.
M. guareae.—Helminthosporium helleri.
M. guareicola.—Coniothyrium glabroides, Helminthosporium glabroides.
M. guignardi.—Helminthosporium helleri.
M. gymnanthicola.—Helminthosporium helleri.
M. helleri.—Microthyriaceae indet., Helminthosporium helleri, Isthmospora spinosa.
M. hessii.—Perisporium paulliniae, Calonectria melioloides, Helminthosporium glabroides.
M. hyptidicola.—Microthyriaceae indet., Naemosphaera hyptidicola, Arthrobotryum caudatum.
M. ipomoeae.—Dimerium piceum.
M. longipoda.—Microthyriaceae indet., Arthrobotryum caudatum, Helminthosporium glabroides.
M. maricaensis.—Helminthosporium glabroides.
M. mayaguesiana.—Helminthosporium helleri.
M. melastomacearum.—Microthyriaceae indet., Nectria portoricensis, Arthrobotryum caudatum, Helminthosporium ocoteae, Isthmospora glabra.
M. monensis.—Calonectria melioloides, Helminthosporium helleri.
M. myrsinacearum.—Helminthosporium helleri.

M. nigra.—Helminthosporium glabroides.
M. ocoteae.—Helminthosporium ocoteae.
M. panici.—Dimerium piceum, Calonectria graminicola, Coniothyrum glabroides, Arthrobotryum penicillium, Helminthosporium panici.
M. parathesicola.—Helminthosporium parathesicolum.
M. philodendri.—Helminthosporium philodendri, Isthmospora spinosa.
M. praetervisa.—Isthmospora spinosa.
M. paulliniae.—Dimerium piceum, Nectria meliolicola, Calonectria melioloides, Arthrobotryum caudatum, Helminthosporium melastomacearum, H. helleri, Fusarium meliolicolum.
M. psidii.—Isthmospora spinosa.
M. psychotriae.—Microthyriaceae indet., Arthrobotryum caudatum, Helminthosporium glabroides, Isthmospora glabra.
M. pteridicola.—Dimerium piceum, Microthyriaceae indet., Coniothyrium glabroides, Arthrobotryum caudatum, Helminthosporium glabroides.
M. puiggiarii.—Helminthosporium glabroides.
M. rectangularis.—Nectria portoricensis, Helminthosporium panici, H. parathesicolum.
M. rudolphiae.—Belonidium leucorrhodinum.
M. smilacis.—Isthmospora spinosa.
M. thouiniae.—Helminthosporium helleri.
M. tortuosa.—Belonidium leucorrhodinum, Dimerium piceum, Pseudonectria pipericola, Calonectria melioloides, Paranectria meliolicola, Coniothyrium glabroides.
M. toruloidea.—Calonectria graminicola, Helminthosporium glabroides, H. helleri.
M. triumfettae.—Microthyriaceae indet.
Microthyriaceous fungus.—Paranectria miconiae.

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EXPLANATION OF PLATES V AND VI

(*l.p.* indicates low power; *h.p.*, high power)

PLATE V

Arthrobotryum

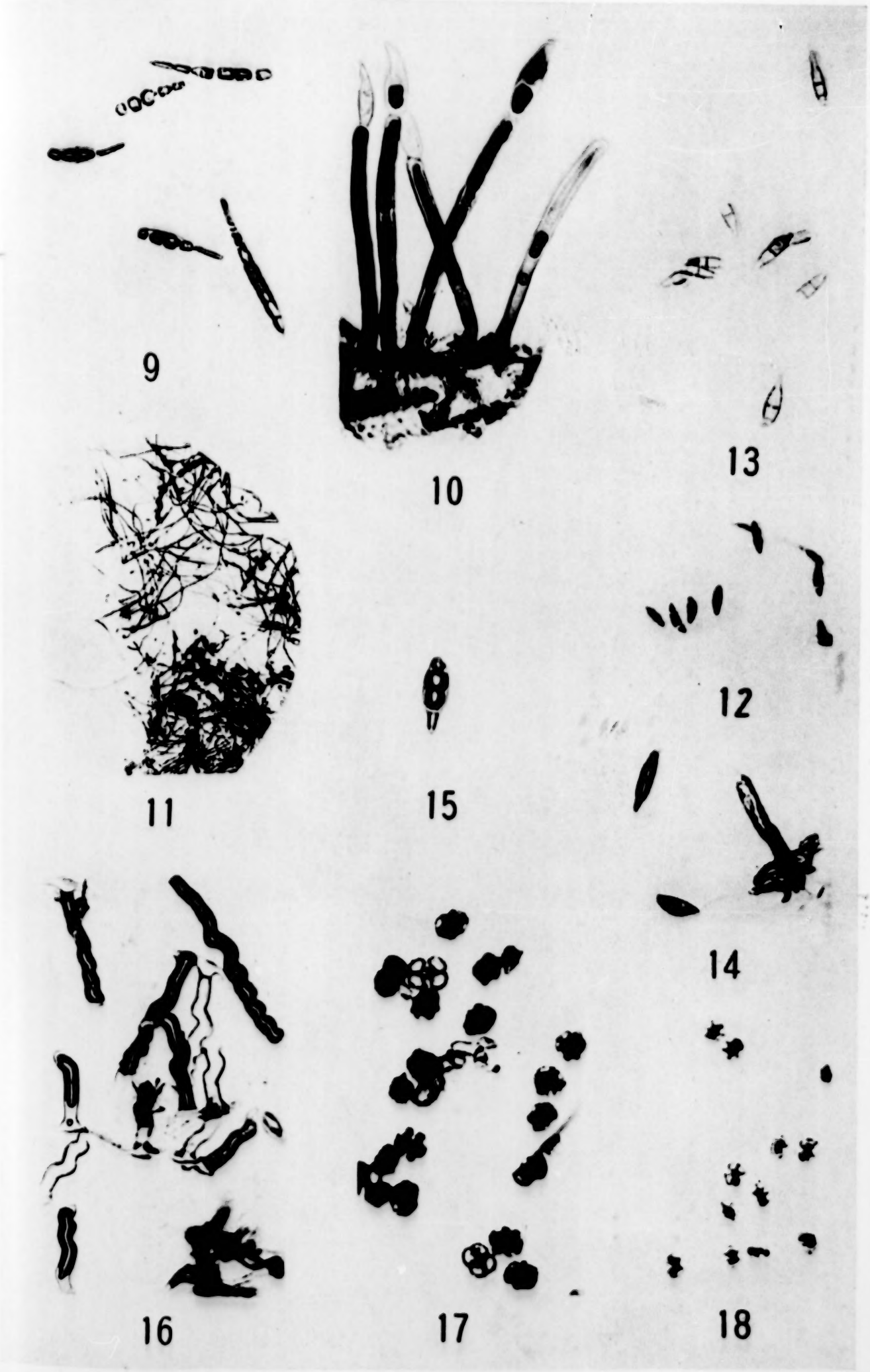
FIG. 1.—*A. glabroides:* fine mycelium overgrowing coarse mycelium of *Meliola;* 7595a, *l.p.*

FIG. 2.—Same, *h.p.*

FIG. 3.—Spores: 7595b, *h.p.*

FIG. 4.—*A. dieffenbachiae:* coremium on a seta; 8077, setal forkings are clearly shown in the coremium.

STEVENS on MELIOLA PARASITES



STEVENS on MELIOLA PARASITES